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United Brewers Industrial Foundation, New York

American beer and ale

New York, N.Y.

[1937]

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What is beer? What is ale? How old is beer? What are some of the earliest written mentions of beer? When and where was the first actual beer mash found? What is the earliest exact evidence of a bre[illegible] the Romans? Who was Gambrinu[illegible]? When were hops introduc[illegible]er first come into use? W[illegible]n the United States? When was the first [illegible]erican brewery established? Were any Colonial brewers men of importance? What are the present taxes on beer? Which States contributed their beer revenue for public schools? For public welfare? How does the brewing industry compare with others in supplying revenue to the Federal Government? What ingredients are used in the brewing of malt beverages? What is malt? What is hops? What part does yeast play in brewing? How is beer made? What is top fermentation? What is a simple explanation of the pasteurization process in brewing? Is beer a liquid food? Is beer a tonic?

American BEER AND ALE

A Handbook of FACTS and FIGURES

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American

BEER AND ALE

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A Handbook of

FACTS and FIGURES

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A Publication of the

UNITED BREWERS INDUSTRIAL FOUNDATION

21 East 40th Street, New York, N. Y.

BOOKLETS AND MANUALS

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INTRODUCTION

INDUSTRY today must recognize its social responsibility. The public must be placed in possession of the facts about the industries which serve it. Accordingly, the United Brewers Industrial Foundation offers this handbook of one of the oldest industries in the world. It has been designed to answer questions on which accurate information is not at present readily available, in order to furnish students, writers and research workers with authentic facts on the brewing industry in a readily accessible, compact form.

Care has been taken to include only material of widest public interest. Thus, chapters have been devoted to such significant phases as Definitions, History and Development, Raw Materials, Processes of Production, Health and Moderation, Production and Consumption, Taxes and Allocation, and Brewery Employment. The various sources used have been checked and re-checked to insure authenticity.

In medieval times brewing was a secret art and a mystery. Today, building on the scientific discoveries and contributions of Pasteur, Hansen and others, brewing has become one of the most scientific of all industries. The science of modern packaging and modern standards of sanitation have developed from the brewhouse experiments of Pasteur; both, moreover, have been brought to their peak in the brewery of today.

But those who now enjoy beer know little more about what they are drinking than did their predecessors of the Middle Ages. The actual story of beer—its values, its contribution to the public welfare as a bulwark of moderation and its importance in the modern industrial scene—has never been fully told.

If those who enjoy beer, realize something more of the significance behind the brews they like, than did their predecessors of medieval days, the care taken in the preparation of this booklet will have been repaid.

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CHAPTER ONE

DEFINITIONS

The following definitions are presented as a means of giving the layman an understanding of the differences inherent in malted beverages. They do not describe the highly technical or manufacturing distinctions which may attach to variations in actual practice.

What is beer?

Beer is a malt and cereal beverage, brewed from any farinaceous (starchy) grain, but generally from malted barley. Beer has a delicate aroma and a mild hop flavor. It is brewed by the bottom fermentation process which is explained on page 18.

What is the derivation of the word "beer"?

"Beer" is a word derived originally from the monasteries; however, the word for beer which occurs in the old High German Benedictine formula may actually be traced back to the Latin infinitive, "bibere" (to drink). The word is first found in the eighth century, having the old High German form "peor" or "bior", corresponding to the old English "beer".

What is the simple meaning and origin of the word "brewing"?

Brewing means simply to prepare by boiling. The word "brewing" is of German origin, and the word "bread" originates from the same root.

What is lager beer?

Lager beer is a sparkling, effervescent, fermented beverage of light amber to dark color. It is brewed principally from barley malt, prepared cereals like corn or rice, and hops and water. The resulting brew or wort is fermented by yeast and then stored in refrigerated cellars for sedimentation. The beer is finished for packaging by carbonation and filtration. The term "lager" itself is derived from the German verb "lagern" and means to stock, to store. Therefore, all present beer is actually lager beer.

What is bock beer?

The term "bock" is given to a special brew of heavy beer, usually somewhat darker in color than light beer and sometimes sweeter in taste than regular beer. Bock beer is generally prepared for consumption in the spring, about Easter time.

What is ale?

Ale is an aromatic malt, or malt and cereal, beverage with a pronounced hop aroma and flavor. It is paler in color and more tart in taste than lager beer. Ale probably originated in the British Isles and first was brewed without hops. It is generally brewed by the top fermentation process explained on page 18.

What is porter?

Porter is a type of ale having a rich and very heavy foam. Some dark or black malt is used to brew a wort high in extract. It is less hoppy and sweeter in taste than regular ale. Porter is brewed like stout, but is not quite so strong.

What is stout?

Stout is a type of ale which is very dark in color, has a strong malt flavor and a sweet taste. It is heavier than porter and possesses a stronger hop character.

CHAPTER TWO

HISTORY AND DEVELOPMENT

How old is beer, according to positive proof?

About 6,000 years old. In 1935, an expedition of archaeologists from the Museum of the University of Pennsylvania and the American Schools of Oriental Research, who were excavating in Mesopotamia, found a seal or drawing, baked in pottery, showing two brewery workers stirring the contents of a brewery vat with long poles.

What are some of the earliest written mentions of beer?

1) Beer, made of barley, is mentioned in the Egyptian *Book of the Dead*, which has been pronounced by scholars to be about 5,000 years old.

2) Beer, called "heqa", made from malt or red barley is mentioned in Egyptian writing as early as the fourth dynasty. Also, papyri of the time of Seti I (1300 B. C.) allude to a person who has been drinking beer.

3) According to the *Extract from the Mirror of Chinese History*, beer, or "kiu", was known to the Chinese in the 23rd century B. C.

4) Herodotus ascribes the invention of brewing to Isis and says that Egyptians drank a liquor fermented from barley which they called "zythos".

5) Xenophon, in *Anabasis*, mentions the use of beer among the inhabitants of Armenia; the Gauls were also acquainted with it in early times.

6) Another designation is that made by the Greek author, Theophrastus, who lived about 300 B. C. In his *History of Plants* he mentions "zythos", the Greek word for beer.

Have the remains of what might be considered ancient beer ever been discovered?

Dr. Moeller, in making extensive excavations at the instance of the German Orient Society upon the burial fields of Abusir-el-Melek

(First Empire, about B. C. 3300), discovered jars of earthenware containing dried beer sediment in the shape of a crumbling substance having a yellowish-brown color.

When and where was the first actual beer mash found?

During excavations in the town of Alzey, Germany, in 1911, a large stoppered jug containing a dark brown substance was found in the ruins of a Roman house which had been burned during the Alemannian invasion of the third century. Chemical analysis some years later proved that the content of the jug was beer mash which, as a result of the tight closure, had retained its character unaltered for sixteen centuries. This jug of beer, set to ferment under the cellar stairs of this Roman home about 300 A. D., is probably the oldest actual beer mash in existence.

What is the earliest exact evidence of a brewhouse?

A small model brewery was unearthed from the tomb of Meket-Re at Thebes by excavations of the Metropolitan Museum of Art in 1919-20. This model, dating from the eleventh dynasty (about 2000 B. C.) is on display at the Metropolitan Museum of Art in New York.

Is anything known of the actual brewing process portrayed in this 4000 year-old model brewery?

The explanation accompanying the model brewery describes the process as follows:

> "Inside the door sits the overseer with baton in hand. In the brewery two women grind flour, which is worked up into dough by a man. The dough is trodden into a mash in a tall vat and then left to ferment in four tall crocks. When fermentation is completed, it is poured off into round jugs with black clay stoppers."

Was beer used by the Romans?

Beer was a popular drink among the Romans and it was considered a special luxury by them. However, their word for beer, "cerevisia", is not derived from the Latin "ceres"—cereals, and "vis"—vigor, as is believed by some. According to Arnold, the word actually originated from the Celtic "keirwysg"—("keir"—wax; "wysg"—water).

What is the earliest reference to ale in English law?

The first appearance of ale in the laws of England was in the year 694, when Ine, or Ini, King of the West Saxons, imposed a tax of twelve "ambers" of seven gallons each of Welsh ale on every subject possessing twelve hides of land.

Is beer mentioned in any of the very early stories?

The Germanic folk-epic, *Beowulf*, the oldest specimen of Anglo-Saxon literature, mentions the mead-hall, the ale-carvuse, and the beer-hall. During the course of the tale, written in the tenth century, there is reference to a banquet at which ale was served.

Who was Gambrinus?

Although it cannot be definitely determined historically who Gambrinus, the so-called "Inventor of Beer", really was, it is usually claimed that by Gambrinus is meant, John I. (Jan Primus) Duke of Brabant, who was killed in a knightly tournament in 1294. He was an exceedingly popular ruler and a heroic figure of his time. Another version, however, maintains that the tutelary protector of the brewers was John the Intrepid (Jean sans Peur, 1371-1419), the founder of the Order of Hops.

When were hops first added in the brewing of beer?

In the ninth century hops were added to the "beor" which was known as a drink with curative powers. The preservative and aromatic properties of hops were undoubtedly responsible for the utilization of hops in brewing. Formerly, beer had been made of water and fermented grain.

Are there any notable examples of the promotion of beer drinking in Medieval Europe?

Emperor Charlemagne did much to promote the drinking of beer. It is known that he strongly insisted on moderation. In the forty-fifth chapter of his *Capitulare de Villis Imperialibus*, it is ordained what artisans and laborers each public administrator shall employ in the district under his jurisdiction. Included in this list is a mention of the beer-brewers.

What mention of beer is there in the church observances of the Middle Ages?

As late as the middle of the tenth century, an edict of King Haakon the Good of Norway decreed that the "Jule" festival should be celebrated together with the Christian festival of Christmas, and that each man be required to brew a stipulated amount of malt for this holy season, and should then celebrate as long as his supply of beer lasted.

Did the church show any active interest in the sale of beer in Medieval times?

Yes. As a matter of fact, the trade was in the hands of the clergy. The bishops themselves traded in the produce of the country: grain, salt, beer, cattle, etc. Thus, the church, as the seat of learning and

culture of the times, included brewing among its craft enterprises—each monastery, in fact, had its own brewhouse. Some of the brands of the old orders and monasteries are actually still in use abroad.

When was lager beer discovered?

The exact date of the discovery of lager beer is not known. However, some time after the seventh century, the monks found that their brew could be held for summer consumption by storing it in cool mountain caves. Thus, the beer was kept at a low uniform temperature throughout the spring and summer season.

What brought about the use of lager beer in the United States?

Nearly one hundred years ago, before the introduction of ice machines, manufacturers of beer were compelled to stop malting and brewing in May on account of inadequate refrigeration. Consequently, they had to brew "auf lager" in order to meet demands during the hot summer months.

What beginnings of craft organization may be noted among the early brewers?

In Germany, Holland, Denmark, and other countries in Northern Europe, the popularity of beer was so great that brewers were responsible for the formation of the first trade unions of burghers and handicraftsmen against oppression by the privileged classes. Brewers' guilds, thus, were actually among the earliest craft organizations and they specialized in training young brewers. Before 1377 brewing was a recognized trade. In 1422 there was a guild of brewers which occupied its own hall and which received, in 1445, a formal charter.

Are any figures available concerning the number of brewers at any time during the Middle Ages?

The importance of brewing at this time may be gauged in some measure by the fact that three hundred brewers were recorded within the city of London and its environs in the year 1419.

When were hops introduced into England?

Hops were first brought into England in the year 1532, according to a popular jingle of the times:

> "The Reformation, and hops with beer,
> Came into England all in one year."

When did bottled beer first come into use?

The development of bottled beer may be traced to an early experiment by a famous Protestant minister of the reign of Edward VI—Dr. Alexander Nowel, dean of St. Paul's in 1561. It was not, however, until after the acceptance of the pasteurization process in 1873, that the bottling of beer began to be carried on on a large scale.

What is the earliest record of a duty on English beer?

The first duty on beer in the United Kingdom was imposed during the reign of Charles II (1660-1685) in which a distinction was made between strong beer and weak beer.

What is the earliest evidence of brewing in America?

Possibly the earliest such evidence may be traced to 1587, two decades before the founding of Jamestown. According to the writings of Richard Hakluyt, Thomas Heriot, one of the adventurers in Virginia, reported, in writing of the corn, or pagatowr, these early colonists found in Virginia:

> "We made of the same in the country some Mault, whereof was brewed as good Ale as was to be desired. So likewise by the helpe of Hops, thereof may be made as good Beere."

Did beer play any specific part in early American colonization?

The historical significance of the shortage of the beer supply on board the Mayflower is a matter of record. Choice of the landing place at Plymouth was thus determined, as recorded in *A Relation, or Journal, of the Beginning and Proceedings of the English Plantation Settled at Plymouth, in New England,* an original manuscript of 1622:

> " . . . For we could not now take time for further search or consideration: our victuals being much spent, especially our beer . . . "

When and where was the first American brewery established?

Numerous claims have been made as to the location and date of establishment of the first brewery in this country. One maintains that the Dutch West India Company built its first brewery in lower Manhattan in 1623. Another claim is based on a law of 1637 of the Massachusetts Bay Colony which bestowed the exclusive right of brewing upon a Captain Sedgwick, who "hath before this time set up a brewhouse at his great charge, and very commodious for this part of the country."

Were any Colonial brewers men of importance?

There were many prominent men among the early brewers of this country. Included among them may be listed the following: William Beekman, burgomaster of New Amsterdam for nine years; General Israel Putnam, famous for his part in the Revolutionary War; Samuel Adams, frequently called the "Father of the Revolution"; James Oglethorpe, founder of Georgia; and, most prominent of all, George Washington, who maintained a brewery at Mount Vernon and whose brews were celebrated for their fine flavor and high quality. Moreover, during the century following the Revolutionary War, a brewhouse was an essential part of the American household.

What early encouragement, if any, was given to brewing in the early days of the United States?

One good example is the motion made by James Madison before the United States House of Representatives in 1789. He moved that the low duty of eight cents a barrel be placed on malt liquors in the hope that "this low rate will be such an encouragement as to induce the manufacture of beer in every State of the Union."

Are there any examples of legislative action in fostering beer drinking in the early days of the United States?

The Massachusetts Act of 1789 states that "the wholesome qualities of malt liquors greatly recommend them to general use, as an important means of preserving the health of the citizens of this commonwealth, and of preventing the pernicious effect of spirituous liquors".

Was brewing specifically fostered by any early legislative enactments?

A definite example of this sort is the Massachusetts Act of 1789 which stated, "to encourage the manufacture and consumption of strong beer," the entire real and personal property of brewers was totally exempted from all taxation.

How did brewing receive its start in Pennsylvania?

William Penn introduced brewing into Pennsylvania. He built a brewery near his house at Pennsbury and many of his acts and ordinances indicate a decided preference for malt liquors. Under his care, the "infant industry" prospered and developed in Pennsylvania.

When and by whom was lager beer first introduced in this country?

Lager beer was introduced about 1840 by expert brewers from abroad and because of its storing qualities gave a new impetus to

brewing in this country. At least one of the breweries established in the 40's has been in continuous operation since that time.

When was the Volstead Act passed?

On October 28th, 1919, Congress passed the Volstead Act, prohibiting the sale, for beverage purposes, of liquor containing over one-half of one per cent alcohol.

How long did it take for the Eighteenth, or Prohibition, Amendment to be ratified? When did the Amendment go into effect?

Mississippi, the first state, ratified the Eighteenth Amendment on January 8, 1918, and Nebraska, the thirty-sixth, on January 16, 1919, to become effective January 16, 1920.

When was the Eighteenth Amendment repealed?

On December 5, 1933, at 5:32½ P. M. (E. S. T.), Utah became the thirty-sixth state to ratify the Twenty-First Amendment repealing the Eighteenth, or Prohibition, Amendment.

When was beer relegalized?

On March 22, 1933, President Roosevelt signed the Cullen-Harrison bill legalizing 3.2 per cent beer and wine. This act made permissible the first sales one minute after midnight on April 7, 1933, in each state not prohibited by state enforcement laws.

Exactly how long did the United States have Federal Prohibition?

Federal Prohibition lasted thirteen years, ten months, nineteen days, seventeen hours, thirty-two and one-half minutes.

CHAPTER THREE

RAW MATERIALS

What ingredients are used in the brewing of malt beverages?

In the United States, the following ingredients enter into the composition of beer, ale, porter and stout: water, malted and unmalted cereals, hops and yeast. In some instances sugar products prepared from cereals, cane sugar and beet sugar are also used.

In what proportion are the chief raw materials found in the finished beer?

The raw materials are found in the following proportions:

1. Water—Comprises between 85 and 92% of the volume of the finished beer.
2. Malt—Supplies between 65 to 75% of the total solid materials used.
3. Rice or Corn Products—Supplies between 25 to 35% of the total solid materials used.
4. Hops and Hop Concentrates—Soluble part of hops imparts to the beer the bitter taste and characteristic aroma; but this is negligible, as the bulk remains in the form of spent hops.

What purpose do the various raw materials serve?

The various raw materials and their function in brewing are as follows:

1. Water—Solvent which dissolves the extractive substances contained in the malt and malt adjuncts.
2. Malt—Supplies most of the nutrient substances, determines the character of the product, supplies the substances necessary for foam formation and palatability; also produces alcohol and carbonic acid gas.
3. Rice and Corn Products—Serve as malt adjuncts in supplying the fermentable and unfermentable extract and contribute their own character to the finished product.
4. Hops—Stabilize the beer, remove some of the unstable and unnecessary nitrogenous substances and impart to the beer the characteristic taste and aroma.

How many pounds of the necessary raw materials go into the production of one barrel of beer?

According to the reports of the U. S. Commissioner of Internal Revenue, the raw materials from which the average barrel of American beer (31 gallons) was brewed during the fiscal years 1934-35-36, were:

37.96 lbs. Malt
.69 lbs. Hops and Hop Extracts
7.68 lbs. Corn and Corn Products
3.48 lbs. Sugar and Syrup
2.69 lbs. Rice

What is malt?

Malt is grain, which has been steeped in water and allowed to germinate or sprout. Although barley is ordinarily used in malting, the word "malt" may be applied to every cereal which has undergone the process of germination.

What are hops?

Hops are the ripened and dried cones of the hop vine used in brewing to precipitate certain proteins and to impart to the beer the characteristic aroma and sharp taste.

What purpose does the lupulin in hops serve in the brewing process?

Lupulin is the resinous substance which forms the most valuable part of hops. It is of great importance in brewing, as it contains those resinous, volatile oils and bitter substances for which hops are particularly prized.

What is yeast and what part does it play in brewing?

Yeast is a single cell plant which reproduces by budding. It is not, however, strictly to be considered a brewing material as it is not used until after the wort has been prepared and generally is not found in the finished product. Yeast is used in brewing to induce fermentation.

Why does beer have a mild alcoholic content?

The alcohol in beer is a result of the breaking down of the sugar through fermentation by yeast. It is also in this way that the carbon dioxide is naturally formed and in approximately the same proportion as the alcohol. Roughly speaking, two parts of fermentable matter give out one part each of the gas and the alcohol by weight.

How many pounds of the principal ingredients of beer were used in the manufacture of fermented malt beverages in the fiscal years 1915, 1935 and 1936?

MATERIALS	1915	1935	1936
Malt	2,141,723,104	1,725,736,002	1,952,210,101
Hops	38,839,294	31,772,887	34,516,246
Rice	167,750,177	139,728,970	116,310,725
Corn	604,890,901	340,841,047	450,230,018
Sugars	109,630,425	155,374,500	167,354,485
Totals	3,062,833,901	2,393,453,406	2,720,621,575

(U. S. Govt. statistics)

How much has American agriculture benefited from relegalization?

Since the return of legal beer in 1933, the brewing industry has consumed more than 9,000,000,000 pounds of grain. Adding the more than $100,000,000 to be spent by brewers for farm products since 1933, the farmers of the United States will have received more than $300,000,000 in direct benefits from relegalization by the end of 1937.

CHAPTER FOUR

PROCESSES OF PRODUCTION

How is beer made?

About the simplest accurate definition of the brewing process has been given by Salem in his *History of Beer*: "A certain quantity of malted barley is taken and ground; it is then mashed with hot water, the sweet liquor or wort extracted, a portion of hops added, and the whole boiled until the preservative quality as well as the aroma of the hops are obtained. It is then allowed to cool, and afterwards fermented with yeast to produce the small quantity of alcohol it contains, and to give it life."

What are the general operations in brewing?

The brewing process may be considered conveniently under the head of three distinct general operations. The first is the mashing process in which the saccharine liquid, called wort, is prepared; the second is the fermentation of the wort; and the third is the storing and finishing of the beer or ale.

What occurs in the first brewing operation—mashing?

The object of mashing is to dissolve the starch of the grain into sugar and dextrine, and to bring the same into a solution called wort. During the mashing process the proteins, mineral substances, coloring matter and other extractive substances are dissolved from the grain. Also, the soluble starch is dissolved and subsequently converted into sugars and dextrines by the action of the enzymes contained in the malt.

What occurs in the second brewing operation—the fermentation of the wort?

The fermentation of the wort is effected by the action of the beer leaven or yeast, which converts a bitter-sweet wort into a palatable, appetizing beverage.

What occurs in the third brewing operation—storing and finishing?

During the storing and finishing process a natural clarifying and maturing takes place through the precipitation of yeast cells, proteins, hop resins, and other unstable substances, and the formation of esters, which impart the characteristic bouquet and flavor to the beer or ale.

How is the barley prepared for brewing?

The object of the malting of the barley is to prepare it for use in the brewery by causing certain changes to take place within the barley kernel. Of these changes the formation of diastase, peptase, and other enzymes; the modification of the meal body; and the development of the malt aroma and flavor are the most important. Malting consists of the following processes:

1. Cleaning and grading
2. Steeping the grain in water
3. Germinating
4. Kilning and curing

In the United States, malting may be considered an allied industry to brewing as it is not generally undertaken by the individual breweries.

What is top fermentation?

Top fermentation is that type which uses top fermenting yeast, in which the yeast rises to the top during fermentation, where it is either removed by suitable implements by a process called "skimming," or is allowed to work out of an opening at the top of the fermenting vessel by a process called "cleansing." This fermentation is carried on at a temperature of 56° to 73° F., at which the top yeast gathers mostly in foam at the surface of the fermenting wort.

What is bottom fermentation?

Bottom fermentation is the type common in American brewing practice for lager beers. This fermentation, using lager or bottom fermenting yeast, proceeds at relatively low temperatures, 45° to 57° F. After about six days the active fermentation diminishes, the temperature is reduced, and the yeast settles to the bottom.

How does the production of beer (bottom fermented) compare with that of ale (usually top fermented)?

Although governmental reports do not differentiate between the production of beer compared to that of ale, using the general classification "malt beverages", it is very likely that lager beer constitutes at least 80% of the total output of American breweries.

What are the characteristics which differentiate beer, ale, porter and stout from each other?

Ordinary beers, ales, porters and stouts are similar in their composition. Some differences may be distinguished by chemical analysis. Essentially, however, they differ only in regard to taste and flavor, which difference is partly due to the process of manufacture and partly to the proportion of the materials employed.

What fixed relationship, if any, is there between the proportions of the ingredients used in the manufacture of beer, ale, stout and porter?

The raw materials used in brewing do not bear any fixed relation to each other, but depend entirely upon the character of the beer to be produced and the demands of the market to be served.

What is meant by "pitching the yeast"?

Pitching the yeast is that process in which the yeast is added to the wort in order to start fermentation.

What is the "wort"?

Wort is the sweet solution obtained by dissolving the soluble substances of the malt and unmalted cereals in water at the proper temperatures, and boiling this solution with hops. This fermentable solution of varying sugar content forms the basis of beer.

What is meant by "steeping"?

Steeping is the soaking of barley or other grain in water for a period of days during the process of malting. This causes the grain to absorb sufficient moisture for proper germination.

What is meant by "krausening" and carbonating?

After fermentation and the necessary storing has taken place, small proportions of young fermenting beer are added and the after-fermentation takes place in the cask. This process is called krausening. Carbonating consists in collecting the gas from fermentation at suitable times, and impregnating the aged beer at any suitable stage with its own gas, which has been previously collected. Following these two operations, the beer is filtered and ready for the market.

Why are wood and steel beer barrels coated on the inside?

The coating of wooden packages with a resinous material (called pitching) is done for the purpose of applying an elastic, impervious coating to the wood, which prevents the absorption of any substances from the wood which might affect the taste of the beer. Metal beer barrels, except the aluminum and stainless steel barrels which are inert to beer, are coated to prevent the beer or ale from coming in contact with the metal.

What is a simple explanation of the pasteurization process in brewing?

Beer, when filled into trade packages, usually contains some live yeast cells which have passed through the filters. Draught beer is kept at low temperatures, and is expected to be consumed within a comparatively short period of time. The limited period of time at

low temperatures retards after-fermentation and the beer retains its clarity and other normal characteristics. Bottled beer, on the other hand, is subjected to higher temperatures, at which yeast ferments rapidly; also, there frequently is a considerable lapse of time between the bottling of beer and consumption. Thus, to prevent the development of the yeast, the beer is "pasteurized" by heating the beer in the bottles to a sensitive temperature and maintaining this temperature for a sufficient length of time to kill any existing yeast cells.

How has relegalized beer benefited the cooperage industries?

Brewers purchased 5,170,000 wooden barrels at a total cost of $31,490,000 from April 1933 to the end of 1936, according to the Associated Cooperage Industries of America, Inc. Purchases of steel barrels up to the end of 1936 are estimated at 1,500,000 at a cost in excess of $10,000,000.

How have packaging industries benefited?

Glass authorities report that sales of beer bottles from relegalization to May 31, 1937 totaled 10,796,000 gross (more than 1,500,000,000 bottles), at a cost of $25,749,500.

A comparative set of figures for cans is not available because this form of container was not marketed on a commercial scale until late in 1935. However, it is estimated that sale of beer cans for 1937 alone will approximate $19,000,000. A prime reason for the comparatively high can sales revenue is that cans are one-trip containers while bottles are refilled many times.

CHAPTER FIVE

HEALTH AND MODERATION

Is beer a "liquid food"?

Beer has definite food value. Dr. Winfield S. Hubbard, formerly with the United States Food and Drug Administration, in speaking of beer says: "Beer is a food . . . contains the two elements which furnish energy and repair the human body, carbohydrates and proteins. . . . I do not know of any food which is as easily assimilated as beer. . . . It is almost ready to be absorbed through the intestinal wall as soon as it leaves the mouth."

What is the caloric content of beer and how does it compare with that of other foods?

Based on an analysis of 385 samples of American lager beer with alcohol content of 3.65 per cent by weight and extract 5.13 per cent, the nutritive value of one pint of beer is 215 calories. The caloric value of one pint of beer would thus be the approximate equivalent of the caloric value of the following:

1	ounce Butter, or	11½	ounces Lean Fish Meat, or
11¼	ounces Potatoes, or	4	ounces Medium Fatty Beef, or
10	fl. ounces Milk, or	5	ounces Lean Beef, or
3¼	ounces Bread, or	3	average Eggs
16	ounces Apples, or		

How many calories are there in a glass and in a container of beer?

An eight-ounce glass contains 108 calories while the average beer bottle or can, holding twelve ounces, has a total of 163 calories.

Is beer a tonic?

Scientists, who have dispassionately analyzed beer, agree that beer has a definite tonic value. Particularly inasmuch as the resins of the hop have tonic effect, beer is a healthful, nourishing food beverage.

Is beer fattening?

Beer in itself is definitely not fattening. The great dietitians, including McCollum, Simmonds, Graves and Bogert, are agreed that it is

over-eating and absence of exercise that produce fat. Beer may be a factor insofar as it stimulates the appetite; but, by the same token, any zestful drink containing carbonic acid gas exercises the same effect. The case is neatly stated by Flint: "I would not blame alcohol for making men fat, but I would blame the fat for not controlling their gluttony, and for being too indolent even to try to exercise."

What is the proper temperature at which beer should be served?

Beer is frequently overchilled, thus spoiling the bouquet of the brew. Actually, at from 40 to 42° F. the foam has proper play, its volatile gases escape, and the lively tang and full flavor of the beer are insured.

Does the drinking of beer promote the drinking of "hard" liquors?

That "hard" liquor consumption is stimulated through the drinking of beer is a misstatement. The following table, covering the eighty years before Prohibition, actually indicates that, with the increase of beer consumption during this period, the drinking of distilled spirits declined.

YEAR	BEER	DISTILLED SPIRITS
1840	1.36	2.52
1850	1.58	2.23
1860	3.22	2.86
1870	5.31	2.07
1871-80 (Av.)	6.93	1.39
1881-90 (Av.)	11.38	1.34
1900	16.09	1.28
1910	19.77	1.42
1917	18.17	1.62

(Compiled from U. S. Govt. statistics)

Also, Dr. Yandell Henderson of Yale University, author of *A New Deal in Liquor,* says on this subject: "There is no truth in the claim that beer or other mild alcoholic beverages develop an appetite for stronger and stronger liquors. . . ."

CHAPTER SIX

PRODUCTION AND CONSUMPTION

How many breweries are there in the United States? In what states are they mostly concentrated?

During the fiscal year 1936 there were 732 breweries in the United States which operated during some part of the year. Pennsylvania led all states with a total of 112 breweries, Wisconsin was second with 91, New York was third with 70, Illinois fourth with 61 and Ohio fifth with 54.

Which were the leading beer producing states in the calendar year 1936?

New York was the largest beer producer with a total of 8,561,443 barrels, Pennsylvania was second with 6,077,043, Wisconsin was third with 5,816,778, Ohio fourth with 3,742,077 and Illinois fifth with 3,714,144.

In what year was the most beer sold in this country?

Beer sales reached a peak in the calendar year 1913 when 2,074,935,152 gallons were consumed. The per capita consumption in that year was 21.5 gallons.

How much beer has been sold in the United States since April, 1933?

The following table shows the total national sales of draught and package beer from 1933 to 1937:

NATIONAL SALES

YEAR	DRAUGHT BEER SALES (BARRELS)	PACKAGED BEER SALES (BARRELS)	TOTAL SALES (BARRELS)
1933 (9 mos.)	11,002,040	3,387,150	20,666,918*
1934	30,012,563	10,022,344	40,034,907
1935	31,831,195	13,311,837	45,143,032
1936	32,768,748	20,231,393	53,000,141
1937 (8 mos.)	21,668,282	16,995,542	38,663,824
Total (to Sept. 1937)	127,282,828	63,948,266	197,508,822*

The first eight months of 1937 represents an increase in beer sales of 6.7% over the same months of the preceding year.

*Includes total sales for April, May and June 1933 for which there is no breakdown for barrels and packaging.

(Source of data: U. S. Brewers' Association)

How much did the sales of 1935 increase over those of 1934 and those of 1936 over 1935?

	DRAUGHT BEER SALES	PACKAGED BEER SALES	TOTAL SALES
1935 over 1934	6.1%	32.8%	12.8%
1936 over 1935	2.9%	52.0%	17.4%

(Source of data: U. S. Brewers' Association)

What months of the year may be considered the "beer season" in which most beer is sold?

It is interesting to note that since 1934 (the first complete year of operation), the beer drinking season has lengthened by three months. In 1934, June, July and August were the only months that exceeded 4,000,000 barrels in sales. In 1935 the month of May was included in this group. However, in 1936, September and October exceeded 4,000,000 barrels, while May, June and August exceeded 5,000,000 barrels and July hit the top mark of 6,670,000 barrels.

What has been the trend since relegalization in package and draught beer sales?

The tax-paid withdrawals by pipe line to bottling house during the first six months of 1935 were 5,557,000 barrels, whereas for the same months of 1937 the figure was 11,287,000 barrels, or an increase of more than 100 per cent! Withdrawals in barrels and kegs in the first half of 1935 and 1937 were 14,514,000 and 14,751,000 barrels, respectively, or an increase of only 237,000 barrels. Thus, package beer has accounted for virtually the entire increase in tax-paid withdrawals of beer between 1935 and 1937.*

*(The 1937 figures were computed from monthly, preliminary government reports.)

How much have the sales of packaged beer increased since April, 1933?

Sales of beer in bottles and cans have shown a steady increase since relegalization. During the last six months of 1933, 23.5% of total sales were in containers. In 1934 the percentage to total was 25%; in 1935, 29.5%; in 1936, 38.2%; and in the first five months of 1937 the percentage of packaged sales to total sales had risen to 42.6%.

How much cereal beverage (near beer) is being produced in the United States?

In the fiscal year 1936 there were only eighteen plants in the country manufacturing cereal beverage (beer containing less than

one-half of one per cent alcohol). Their total production for the year was 119,000 barrels—less than one-fourth of one per cent of the production of malt beverages.

What is the earliest record of beer consumption in the United States?

The first government records of beer consumption date back to 1840. In that year consumption amounted to 23,310,843 gallons, or 1.36 gallons per capita.

How do the years 1913 and 1936 compare statistically in beer production?

In the calendar year 1913, at the peak of beer sales, some 1,200 breweries brewed nearly 67,000,000 barrels of beer for a territory in which beer was legal that was limited to 55,000,000 people. In the calendar year 1936, about 700 breweries produced 53,000,000 barrels for a population of 117,000,000 people in the areas where beer was legal.

How do the fiscal years 1936 and 1937 compare in production and tax-paid withdrawals (sales)?

According to preliminary government reports for the fiscal year 1937, 58,743,000 barrels were produced and 55,351,000 barrels withdrawn tax-paid. Withdrawals by barrels and kegs totaled 32,405,000 barrels (draught beer); withdrawals by pipe line to bottling house totaled 22,947,000 barrels (container beer). These figures are 13 per cent higher than the corresponding ones for the fiscal year 1936 in which 51,812,000 barrels were produced and 48,760,000 barrels withdrawn tax-paid. Removals by barrels and kegs and by pipeline in 1936 were 32,431,000 and 16,329,000 barrels, respectively. The 1936 totals were 15 per cent higher than those of 1935.

What was the national per capita consumption of beer in the calendar year 1936?

Using the Census estimates of population for 1935, the per capita consumption in the United States in 1936 was 12.8 gallons.

What states led in per capita production in 1936?

Wisconsin had the highest per capita production with 23.2 gallons, Michigan was second with 22.9, Nevada was third with 22.3, Minnesota fourth with 21.7, and Illinois fifth with 19.7 gallons.

Which geographical areas in the United States had higher per capita production figures than the national per capita consumption for 1936?

The Middle Atlantic states including New York, New Jersey, and Pennsylvania produced 18.41 gallons per capita; the East North-Central group, including Ohio, Indiana, Illinois, Michigan and Wisconsin produced 18.73 gallons per capita; and the West North-Central group, including Minnesota, Iowa, Missouri, North Dakota, Nebraska produced 14.51 gallons per capita. These three geographical groups were the only ones that exceeded the 1936 national per capita consumption figure of 12.8 gallons.

What was the average per capita production for each geographical area in 1936?

AREA	GALLONAGE PRODUCTION
NEW ENGLAND	
Maine, Vermont, Massachusetts, Rhode Island, Connecticut	13.85
MIDDLE ATLANTIC	
New York, New Jersey, Pennsylvania	18.41
EAST NORTH-CENTRAL	
Ohio, Indiana, Illinois, Michigan, Wisconsin	18.73
WEST NORTH-CENTRAL	
Minnesota, Iowa, Missouri, North Dakota, Nebraska	14.51
SOUTH ATLANTIC	
Delaware, Virginia, West Virginia, South Carolina, Georgia, Florida	6.19
WEST SOUTH-CENTRAL	
Arkansas, Louisiana, Oklahoma, Texas	5.61
EAST SOUTH-CENTRAL	
Kentucky, Tennessee, Mississippi	5.54
MOUNTAIN	
Montana, Idaho, Wyoming, Colorado, Utah, New Mexico, Arizona, Nevada	10.39
PACIFIC	
Washington, Oregon, California	13.83

(Source of data: U. S. Brewers' Association)

CHAPTER SEVEN

TAXES AND ALLOCATION

What are the present taxes on beer?

The Federal tax is $5.00 per barrel. State taxes vary from $.62 in several states to a high of $4.96 in Maine.

How do the present taxes compare with pre-Prohibition taxation?

From 1903 to 1914, inclusive, the Federal tax was $1.00 per barrel; there was no state taxation.

How much tax revenue did the brewing industry provide in the calendar year 1936?

To the Federal government, the brewing industry contributed more than $270,000,000, while nearly $100,000,000 revenue from taxes on the manufacture and sale of beer was collected by the states, counties, and municipalities. Excise and barrelage taxes collected by the states amounted to about $65,000,000 and the balance was obtained by local governments.

Which states contributed their beer revenue for public schools?

Fifteen states used all or part of their beer revenue for educational purposes in 1936, as follows:

Arkansas	$203,127.02	Illinois	$421,133.55
Georgia	454,491.81	Indiana	205,359.25
Idaho	129,885.21	Kentucky	535,645.15
Louisiana	696,388.31	Oklahoma	800,597.97
Mississippi	87,500.00	So. Carolina	503,552.85
Missouri	413,081.80	Tennessee	158,982.15
Nevada	35,005.07	Texas	367,391.26

Nebraska allots all revenue from beer license fees to local school districts.

(Source of data: National Institute of Manufacturers and Distributors)

How much of the revenue derived from beer by the states and municipalities in 1936 was used for public schools and public welfare?

Of the taxes accruing to the states and their political subdivisions in 1936, about 50% was used for public schools and public welfare. Direct allocations of state revenue and public schools totaled about 10%, and about 40% was used for general public welfare activities.

Which states contributed their beer revenue for public welfare?

Eighteen states used all or part of their beer revenue for public welfare purposes in 1936, as follows:

Arizona	$212,324.83	N. Hampshire	$188,714.05
Arkansas	87,054.44	New Jersey	1,600,000.00
Colorado	317,374.73	North Dakota	742,099.92
Illinois	947,550.71	Ohio	1,701,084.88
Kentucky	259,703.64	Oregon	524,207.43
Maryland	687,495.82	South Dakota	370,707.28
Mississippi	40,000.00	Texas	1,102,173.79
Montana	25,075.69	Wyoming	51,021.79
Nevada	19,760.93		

Nebraska assigns its beer gallonage revenue to the fund out of which $700,000 was appropriated for old age assistance.

(Source of data: National Institute of Manufacturers and Distributors)

Were there any states that did not derive any revenue from beer in 1936?

Alabama and Kansas obtained no revenue from beer in 1936, but early in 1937 both enacted laws legalizing and taxing beer.

How does the brewing industry compare with others in supplying revenue to the Federal government?

The brewing industry is one of the leading Federal tax-payers. More than $1,000,000,000 had been received by the government from beer revenue during the period from April, 1933, to August, 1937. Incidentally, this figure does not include the State-imposed taxes which have totaled approximately $400,000,000 since relegalization.

CHAPTER EIGHT

BREWERY EMPLOYMENT

How was labor aided by the relegalization of beer?

In March, 1933, one month prior to relegalization, there were more than 15,000,000 unemployed in the United States. At least 7% of those unemployed were given work when the relegalization of beer became effective.

What is the brewing industry's annual payroll for labor?

More than $80,000,000 will be paid to labor by the brewing industry in 1937. New contracts recently negotiated with labor leaders are in part responsible for this figure.

Does the $80,000,000 to be paid labor include all workers and brewery officials?

The figure given for the labor payroll is exclusive of the estimated $25,000,000 which will be paid the salaried employees and officers. Thus, the aggregate payroll for 1937 will exceed $100,000,000.

How many wage earners and salaried employees are included in this payroll?

Conservatively, there are more than 55,000 on brewery payrolls in 1937. This total is determined by adding the 46,682 wage earners, estimated on the basis of the monthly reports of the U. S. Dept. of Labor, to an estimated total of 9,000 salaried officers and employees.

What is the weekly salary of brewery workers?

The average brewery worker, excluding salaried employees, chemists and brewmasters, on the basis of the labor contracts signed in 1937, receives an average salary of more than $35.00 per week.

How does the 1937 weekly wage compare with that of the pre-Prohibition year of 1914?

The 1937 average wage is more than twice that of 1914. In the latter year the average salary of the brewery worker was $16.52 per week.

What changes, if any, may be noted in the brewery payrolls of recent years?

The following table shows the trend in brewery payrolls for the last three years:

Calendar Year	Wage Earners* (Average for the year)	% Increase over previous year	Paid Total Wages	Yearly Wage Per Person	Weekly Wage Per Person	% Increase Over Previous Year
1935 **	39,169		$60,614,924	$1,547.52	$29.76	
1936	43,182	10.2	69,765,300	1,615.61	31.07	4.4
1937 ***	46,682	8.1	78,306,090	1,677.44	32.26	3.8

* Does not include salaried employees.

** U. S. Department of Commerce Census of 666 breweries in 1935.

*** Based on average index for first four months of 1937 compared with first four months of 1936. Does not take into account the present increase in wage scale provided for in the new labor contracts.

(Source of data: U. S. Brewers' Association)

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THE UNITED BREWERS INDUSTRIAL FOUNDATION has been organized to align the brewing industry with every force working for the public good in this country — law enforcement, moderation and a recognition of the social welfare. The industry recognizes the vital importance of its relationships to the public and places itself and its future squarely before the American people.

The Foundation functions in two ways: (1) To interpret the public interest to the brewers, so that they may govern their attitudes and actions accordingly, and (2) to interpret the industry to the public so that the public may judge of the industry on the basis of the facts.

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The Foundation is interested in *your* opinion. It wants to know not only what you think about beer in its general relation to the public, but also more specifically what you think about beer in relation to your own field, whether it be health, medicine, nutrition, labor, publishing, farm interests, women's interests or economics. It wants to know what it can do to be helpful. Your suggestions for specific activities which might be undertaken will therefore be welcome.

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UNITED BREWERS INDUSTRIAL FOUNDATION

Jacob Ruppert, Chairman

21 East 40th Street, New York, N. Y.

What is beer? What is ale? How old is beer? What are some of the earliest written mentions of beer? When and where was the first actual beer mash found? What is the earliest exact evidence of a brewhouse? Was beer used by the Romans? Who was Gambrinus? When was lager beer discovered? When were hops introduced in England? When did bottled beer first come into use? What is the earliest evidence of brewing in the United States? When was the first American brewery established? Were any Colonial brewers men of importance? What are the present taxes on beer? Which States contributed their beer revenue for public schools? For public welfare? How does the brewing industry compare with others in supplying revenue to the Federal Government? What ingredients are used in the brewing of malt beverages? What is malt? What is hops? What part does yeast play in brewing? How is beer made? What is top fermentation? What is a simple explanation of the pasteurization process in brewing? Is beer a liquid food? Is beer a tonic?

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TITLE